CLAIMS

1. An intra-medullary rod, comprising:

a cylindrical body made of an X-ray transmitting material;

a plurality of wires, which are made of a material that does not transmit X-ray and are deposited at regular intervals along a surface of the cylindrical body in the circumferential direction, being extended in an axial direction in a spiral shape,

wherein each of the wires is made in a way that a starting end and a terminating end of the cylindrical body are connected by the shortest distance along the outer surface thereof.

2. An intra-medullary rod comprising a cylindrical body made of a non-metallic material and a plurality of wires in a spiral shape being formed on an outer surface of the cylindrical body at regular intervals, wherein provided that a first circle and a second circle at both ends of the cylindrical body each having a same diameter corresponding to the surface portion are formed, a starting end of each of the wires is located at regular intervals on the first circle, a terminating end of each of the wires is at a position on the second circle rotated in predetermined-degree increments from the starting end, and each of the wires connects the starting end and the terminating end of the cylindrical body by a straight line when the cylindrical body is developed on a plane.

3. The intra-medullary rod according to claim 1 or claim 2, wherein the cylindrical body is made of an acrylic resin and each of the wires is made of stainless steel.

4. An intra-medullary rod according to claim 1 or claim 2, wherein the cylindrical body is a hollow cylindrical body having a metallic core material at the center, and the core material is connected to an end of the metallic material deposited on both ends of the outside of the cylindrical body.

5. An intra-medullary rod, comprising: a cylindrical body of which central portion except for both ends is made of an X-ray transmitting material, and a plurality of spiral-shaped wires made of a material that does not transmit X-rays and being installed on a surface of the cylindrical body at regular intervals, each of the wires connecting a starting end and a terminating end of the cylindrical body by the shortest distance, and

wherein, in a fluoroscopic image of the cylindrical body, a distance from an origin to an intersection of the wires is measured by an amount of rotational angle of the intra-medullary rod.

6. The intra-medullary rod according to one of claims

1 - 5, wherein a length of the cylindrical body is 90mm and 4 stainless steel wires are installed at intervals of 90 degrees along an outer surface portion of the cylindrical body.

7. A bone cutting positioning jig for indicating a bone cutting direction, comprising: a bone cutting direction indicator having a base, a universal joint being movably and rotatably supported around three axes to the base of the bone cutting direction indicator through a ball joint and having a direction indicating jig, and an intra-medullary rod fixed to one end of the universal joint,

wherein the intra-medullary rod comprises a cylindrical body made of a non-metallic material and a plurality of wires in a spiral shape being formed on an outer surface of the cylindrical body at regular intervals, an intersection of each of the wires having a marker indicator function providing rotational position information;

wherein the bone cutting direction indicator comprises a guide having a guide groove on an upper surface and being attached to the base through a shaft for determining an inversion and evagination angle, and a guide having a guide groove on an upper surface and being attached to the base through a shaft for determining a bending and stretching angle;

wherein a front end of a direction indicating jig of the universal joint is inserted into an intersection of the groove

of the guide for determining an inversion and evagination angle and the groove of the guide for determining a bending and stretching angle; and

wherein the bone cutting direction is determined by the direction indicating jig.

8. A bone cutting positioning jig for indicating a bone cutting direction, comprising: a bone cutting direction indicator having a base, a universal joint being movably rotatably supported around 3 axes to the base of the bone cutting direction indicator through a ball joint and having a direction indicating jig, and an intra-medullary rod fixed to one end of the universal joint,

wherein the intra-medullary rod comprises a cylindrical body made of a non-metallic material and a plurality of wires in a spiral shape being formed on an outer surface of the cylindrical body at regular intervals, in which, provided that a first circle and a second circle at both ends of the cylindrical body each having a same diameter corresponding to the surface portion are formed, a starting end of each of the wires is located at regular intervals on the first circle, a terminating end of each of the wires is at a position on the second circle rotated in predetermined-degree increments from the starting end, each of the wires connects the starting end and the terminating end of the cylindrical body by a straight line when the cylindrical

body is developed on a plane, and an intersection of each of the wires has a marker indicator function providing rotational position information;

wherein the bone cutting direction indicator comprises a guide having a guide groove on an upper surface and being attached to the base through a shaft for determining an inversion and evagination angle, and a guide having a guide groove on an upper surface and being attached to the base through a shaft for determining a bending and stretching angle;

wherein a front end of a direction indicating jig of the universal joint is inserted into an intersection of the groove of the guide for determining an inversion and evagination angle and the groove of the guide for determining a bending and stretching angle; and

wherein the bone cutting direction is determined by moving the inversion and evagination angle-determining guide of the direction indicating jig to indicate the inversion and evagination angles and by moving the bending and stretching angle-determining guide to indicate the bending and stretching angles.

9. A total knee joint replacement assisting terminal, which uses a computer, has a planning assistance function before an intervention and an intraoperative assistance function, and supports a total knee joint replacement performed with aid of

a bone cutting positioning jig indicating a bone cutting direction by the intraoperative assistance function,

wherein the bone cutting positioning jig comprises a bone cutting direction indicator having a base, a universal joint being movably and rotatably supported around three axes to the base of the bone cutting direction indicator through a ball joint and having a direction indicating jig, and an intra-medullary rod fixed to one end of the universal joint;

wherein the intra-medullary rod comprises a plurality of wires, which are made of a material that does not transmit X-ray and are deposited at regular intervals along a surface of the cylindrical body in the circumferential direction, being extended in an axial direction in a spiral shape;

wherein each of the wires is made in a way that a starting end and a terminating end of the cylindrical body are connected by the shortest distance along the outer surface thereof;

wherein the intraoperative assistance function includes:

a function of acquiring, by a C-arm fluoroscopic apparatus, a radiographic image data of the intra-medullary rod inserted into a tibia;

a function of acquiring, on the fluoroscopic image obtained by the fluoroscopic apparatus, rotational position information of the intra-medullary rod in a medullary cavity out of the position of an intersection of a pair of wires of the intra-medullary rod; and

a function of determining a bone resection margin using the intra-medullary rod as a reference anatomical axis; and

wherein an anterior articular surface of the femur is determined perpendicularly to a load shaft from an angle with the femoral load shaft determined using the planning before the intervention, and a resected bone surface is determined.